**BP America, Inc**

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**Via Email**
DATE: August 9, 2007

To: Dr. Alan Lloyd, Chair, ETAAC
Bob Epstein, Vice Chair, ETAAC
Subject: BP Suggestions for "Game Changers"

Dear: Alan and Bob:

Enclosed, please find ideas for "Game Changers" as suggested by BP. Feel free to contact Bill Gerwing or me for more information

Sincerely,

Ralph J. Moran
Director, West Coast Climate Change Issues

**BP Suggestions for ETAAC "Game Changers"**

## 1) Carbon Capture and Storage

While it is important to continue to emphasize the perhaps trite statement that there are no silver bullet solutions to address climate change, it is difficult to envision a stabilization scenario in which CCS does not play a large role. The Intergovernmental Panel on Climate Change (IPCC) has estimated that the technical potential for CO2 storage is likely to exceed 2000GT CO2, with the largest capacity likely to exist in deep saline formations. Given that today's CO2 emissions from the use of fossil fuels is around 24GT CO2 per year, geological storage has the capacity to store 70 - 100 years of all CO2 emissions. Others have estimated that CCS could contribute up to ¼ of the needed reductions in CO2 emissions in order to solve climate change, meaning that CCS has a potential of approaching 400 years. Additionally, when CO2 is stored through use in EOR operations, there is a genuine win-win for the environment and energy security.

What steps remain to be taken to design a long term carbon sequestration strategy that garners the public's confidence?

There are three parts to this:

* Further Technology development
* Education around CCS and outreach
* Large scale (1 million tonnes/y CO2 or greater) demonstration projects in a variety of different reservoir types and locations.

This needs to be managed via a "Deployment Strategy" - an overarching framework or plan, that is consistent with a clear objective that will be achieved by a specific point in time. Set a goal then put in place a plan to achieve the goal, being clear and transparent on the conditions of satisfaction required along the way to secure the publics confidence.

We need to put regulations and policy measures in place that will allow geological storage to happen. Industry needs a regulatory framework so that the operating conditions are clear and industry needs policy put in place to define the necessary business and commercial conditions.

What is needed to enable CCS beyond EOR?

We also need to identify and remove key roadblocks that exist, for example:

* What happens to any liability associated with CO2 storage after a site is safely closed?
* Who owns the pore space of the rock? The mineral laws are unclear about the ownership of the very pore space in the rocks that will be used to store CO2.

Removing the barriers, putting a deployment strategy, regulations and policy in place will be essential to enable large scale CO2 storage to take place and this is needed to convince

the public, regulators and governments alike, that CCS is a safe and a practical technology that can help solve climate change.

When will CCS be viable for deployment?

It is time to get on with the job at hand. This technology is available now and with some help we can make it happen at scale. This is being demonstrated by BP, who have announced two Hydrogen power projects, that with CCS, will produce low carbon power from Fossil fuels.

We know that CCS is part of the solution to the climate change problem, reports such as that from IPCC and Princeton's Wedge analysis, estimate that CCS technology has the capability to contribute around a quarter of the emission reductions needed to get to environmental stabilization. We have the technological know-how to do this, we need the policy and regulatory framework to enable its deployment.

**2) Lignocellulosic Technology**

The challenges posed by addressing GHG emissions from the transport sector are no more clear than here in the Golden State. A successful solution will require focus on the three "buckets" of transport emission levers including vehicle, fuel and consumer. For addressing the fuel "bucket", we are optimistic about the role of biofuels. A key constraint on delivering the benefits of biofuels is the availability of secure and sustainable supplies of renewable feedstocks that can be economically converted to biofuels. The largest pool of renewable feedstocks that are potentially available in the quantities required to significantly expand biofuels production are lignocellulosic (LC) materials including plant residues, dedicated energy crops and waste materials. While the conversion of LC materials to ethanol has been the subject of extensive research over the past decades and demonstration-scale plants are starting to become real, there is considerable additional work required to make LC conversion economic on a wide-scale.

**3)Solar Energy**

BP is investing in new technology, research and ramping up manufacturing capacity - all in pursuit of grid parity, known in the industry as the "solar holy grail". Once achieved, consumers can harness electricity from the sun at the same price or lower than they can from fossil fuels, but in a way which results in far fewer GHG emissions. Well designed policy can help accelerate California's achievement of this holy grail. Key policy ideas include:

A. Continued scale-up of solar power deployment on new and existing homes, businesses and state structures to transform the retail power market. While solar offsets the most expensive peak power, lowering electricity bills for consumers and helping meet overall power demand, it also helps reduce CO2 emissions. An average-sized home with a 3 kilo-watt solar system would off-set 94 tons (or 188,250 pounds) of CO2 over the 25-year life of the system (PV modules have 25-year warranty though expected life of typical home system is in 30 to 40 year range). As a result of the CA Solar Initiative to accelerate solar market development, in the 2016 time frame, solar is expected to be competitive with

conventional sources of power and then will be deployed at a scale that will transform future power production.

Key actions to promote continued scale-up:

* Retail customer time-of-use (TOU) rates that optimize the benefits of solar power investment
* Solar incentives reflecting market developments
* Customer-friendly and limited paperwork administrative burden

Such a scale also presents an opportunity to transform the electricity grid, providing a host of desired benefits.

B. "Green Grid/Community Power" - The Electricity Grid of the Future

Integrating existing solar, electric/hybrid autos, battery storage and energy efficiency technologies in homes to provide clean, reliable, and dispatchable power can reshape the delivery of electric power.

Key elements of the Green Grid/Community Power:

* Solar electric systems combined with energy efficiency technologies delivering zero or near zero energy homes designed into or planned in community/new development
* Dispatchable energy storage: new generation batteries in homes and in electric or hybrid cars charged by and tied into home solar power systems then can provide dispatchable power when needed
* Advanced Demand-Side/Load Management: electric rate price signals and management of power use to reduce peak power loads/costs and to promote system reliability
* Advanced Metering/Communications: advanced metering and universally available wireless data mechanisms can be used to dispatch power sources to where needed in real-time basis

A fully integrated electric grid of the future will provide a host of benefits:
* Power at the point of demand on a community scale with energy efficiency will promote grid system reliability and meet growing demand while deferring or eliminating investment in conventional grid T&D and new generation infrastructure
* Promotes important energy independence and energy security objectives
* Optimizes capital resources and ensures multiple benefits for each element of the system as described above. In the case of electric or hybrid cars, they provide mobility and when not in use power in their batteries can be dispatched to meet load demand, even at peak times. Solar provides power for the home and for a home battery storage system and can charge the battery for the electric or hybrid car.
* Reduction of GHG emissions on a substantial scale

These technologies exist today. The question is thoughtful integration and planning to deliver the grid of the future.